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AMRDEC STRENGTH THROUGH TECHNOLOGY

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US Army

Presented to:

NTSB UAS Conference

UAS Airworthiness

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TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

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UAS Issues

- **Aviation Community:**
  - **Many UAS vendors have not followed traditional Aviation Industry Standard design and construction processes.**
  - **UAS are part of the Aviation Community. The Aviation Mind-set must be embraced.**
    - **Contemporary aviation design and manufacturing practices must be implemented**
    - **Check Lists need to be followed.**
    - **Aviation maintenance practices must be implemented.**
  - **Because UAS are unmanned, some of the requirements/standards may be different, but the airworthiness *process* needs to be the same as that for manned aviation.**
  - **No UAS should be operated anywhere without an Airworthiness Release.**
  - **Active configuration management/control must be implemented and all system modifications must be approved through the Airworthiness Release process.**
  - **Continued Airworthiness processes must be implemented.**

Army Definition of Airworthiness

A Demonstrated Capability Of An Aircraft Or Aircraft Subsystem, Or Component To Function Satisfactorily When Used And Maintained Within Prescribed Limits

AR 70-62

UAS Levels of Airworthiness

Vehicle Size	General Guidance		Airspace		
	Max Wt (lbs)	Max Speed (kts)	International & National	Active Restricted & Combat Zones	Expendable UA in Active Restricted (per RCC 323-99)
Med/Large	>1320	>200	1	2	3
Light	Up to 1320	200	1	2	3
Small / Mini / Micro	Up to 55	120	COA Process (Addressed on case-by-case basis)	3	3

Level 1 certifies to standards equivalent to manned systems tailored for UAS

Catastrophic failure rates no worse than 1 loss per 100,000 flight hours

Level 2 authorizes to standards less stringent than those for manned systems

Catastrophic failure rates no worse than 1 loss per 10,000 flight hours

(Minimum Level for Weaponization)

Level 3 authorizes to a minimum acceptable level of safety

Catastrophic failure rates no worse than 1 loss per 1,000 flight hours

Certificate of Authorization (COA)

- **COAs are currently used to allow UAS to operate in the National Air Space (NAS)**
  - **This will continue for all UAS until the FAA develops File-and-Fly procedures for Level 1 UAS and DoD certifies a Level 1 UAS to operate within those procedures**
  - **A COA will still be used in the future to allow Level 2 and some Level 3 military UAS limited access to the NAS**

- **COA operations are limited is scope and envelope**
  - **Geographic limitations**
  - **Tight restrictions and controls**

- **There is a lot of work to be done to educate all the players to the same level of understanding on COA process**
  - **Application procedures and consistent input**
  - **Restrictions, rules, and requirements.**

Level 3 Airworthiness Release Considerations

- Demonstrated stability and controllability
- Description of the Operations to be performed
- Sectionals with operation areas marked
- Completed Range Commander's Council Document RCC 323-99 Criteria Checklist and any analysis/procedure used to mitigate risk
- RCC 323-99 supplement Appendix B: Range Safety Review Questions for UAV Projects
- Estimated population density in people per square mile.
- System Safety Risk Assessment and/or Safety Assessment Report
- Risk acceptance (if residual Medium Risk are identified)
- Operator's manuals
- Operator Training and Qualifications
- Checklist
- Frequency authorizations
- Emergency procedures
- Test Plan for operations (if applicable)
- Weight and balance
- Configuration Management Document
- Unit SOP for Flight Operations
- Records Keeping
- Maintenance Practices

UAS Players

- DoD
  - UAS JIPT
  - Joint Airworthiness IPT
  - NATO – Flight in Non-Segregated Airspace (FINAS)
- FAA
- Industry
  - RTCA SC-203
  - Others
- Program Offices
- Users

Summary

- **Much has been accomplished in identifying the special requirements for UAS**
- **Different levels of certification have been developed**
- **COA Process will be needed for long term**
- **A continued partnership with all the players is a necessity to achieve our goals**
- **Numerous Airworthiness Standards are still missing for “file-and-fly”**
- **Still work-in-progress and will be for awhile**